Type, female, No. 21996, U. S. Nat. Mus.; Teffé [or Ega, State of Amazonas, Brazil], June, 1906 (Ducke), presented to the National Museum by Mr. F. V. Theobald at the instance of Dr. L. O. Howard. The specimen was included with some *Sabethes* which we had asked for and was probably, on a casual examination, mistaken for one at the time.

WESTWARD EXTENSION OF THE CANADIAN MOSQUITO FAUNA

(*Diptera, Culicidæ*)

By HARRISON G. DYAR

The Canadian fauna comprises a complex of species of unequal distribution. We direct attention to the species inhabiting the northern forests and not found elsewhere as the essential constituents of the fauna. These species have been mainly described from the extremes of distribution, where the fauna touches the mountains of New York and New England; but it is a well-defined fauna, centering in the forests north of Lake Superior. I had carried the impression that this fauna was separated from that of the Rocky Mountains by a wide reach of prairie; but that is not the fact. Explorations conducted in the summer of 1918 show that the fauna follows the forests along the North Saskatchewan River right into the heart of the Rockies. The forest extends practically unbroken from Ontario to the Lake of the Woods and Lake Winnipeg, into which the Saskatchewan flows. The fauna, therefore, passes around the prairies to the north. It passes the summits of the Rockies and extends down the west slope into British Columbia. I hope to make the distribution in British Columbia the object of another exploration.[1]

Besides my own material of 8,542 specimens, collected last summer, Dr. C. Gordon Hewitt has loaned me for examination 310 specimens collected along the Albany River in Ontario.

[1] See remark below under *Aëdes pullatus*.

Several names have been proposed by the older authors for species in this fauna, and some of these names have been arbitrarily identified on the basis of the types being unrecognizable in this group. (Compare Howard, Dyar & Knab, Monograph, iv, 757.) The descriptions certainly are unrecognizable; but the types themselves may be identifiable by a competent examination, which has never been applied. I propose, therefore, to brush aside these identifications and list the following names to be identified later: *testaceus* van der Wulp,[1] *provocans* Walk., *impiger* Walk., and *implacabilis* Walk.

Mr. F. W. Edwards, who had charge of the mosquitoes at the British Museum until duties connected with the war took him away, kindly made a preliminary examination of the three Walker types for me. He found the specimens in very bad condition, as was anticipated, and he did not have with him Canadian material to compare, but his notes indicate that *impiger* is probably *punctor*, form *abserratus*, while *implacabilis* seems to be typical *punctor* (*auroides*). Of *provocans* from Nova Scotia I am not so sure; but it would seem to be typical *punctor*. It can hardly be the form described by us in the monograph as *provocans* (page 748), which is a dark form like *abserratus*. Further comparisons will be made, with specimens.

The species are treated in the order of importance, beginning with those most essentially Canadian and ending with those that, while occurring in this fauna, are also distributed elsewhere.

These species are essentially forest-lovers. They do not come out onto the prairie except for limited excursions after nightfall. The prairie species likewise keep to their own especial habitat; but the peculiar distribution of prairie and forest toward the north, where patches of forest occur in the prairie and then patches of prairie occur in the forest, makes the species dovetail in an interesting way. In Banff, Alberta, for

[1]See the discussion under *Culex saxatilis*.

instance, typically a forested country, the Canadian fauna occurred everywhere; but there are open spaces in the valley and here *Aëdes spencerii* and *A. curriei* could always be found, though never seen in the forest. Likewise at Saskatoon, Saskatchewan, a typically prairie region, patches of bush occur in hollows in the prairie and along the river, and in these *A. punctor* was not infrequent. In addition, there exists a group of species whose habitat may be said to be the prairie forests. Mr. Knab, who had experience with these forms in 1907, was of the opinion that *A. fletcheri* was a prairie species and *A. riparius* a forest species. I am convinced that both occur together, roaming over the prairie in the general vicinity of bush, and extending a certain distance into the true forest. Moreover, the two are indistinguishable in the female adult and constitute a pair of species as in the case of *A. fitchii* and *A. excrucians*. They are easily separable by the male genitalia, but from localities where only females are at hand I have found it impossible to say which species was before me.

Exact determinations from the female adult alone of the species with black tarsi, also, are not always possible, for, while the mass of specimens runs true to type, variations occur that overlap specific limits. For example, dark examples of *punctor* cannot always be told from *intrudens;* blurred examples of *lazarensis* cannot be told from the double-striped form of *punctor;* pale *lazarensis* and dark *diantaeus* are not separable; small *pionips* cannot easily be told from large, well-marked *diantaeus; decticus* runs into *lazarensis* on the one side and *intrudens* on the other, so that there is a complete circle of gradations between these six species. This affords a margin of error in naming the captured females that I have not been able to guard against.

The specimens collected along the Albany River by Mr. H. N. Awrey, at the instance of Dr. C. Gordon Hewitt, are of especial interest because they include the locality, Martin Fall, Ontario, formerly known as "St. Martin's Falls, Albany River, Hudson's Bay," which is the type locality for *punctor* Kirby,

impiger and *implacabilis* Walker. Sixty-nine specimens were taken at Martin Fall, as follows:

Aëdes punctor Kirby, form *centrotus* H., D. & K. (possibly including some *intrudens* Dyar, though I think not) 52
Aëdes excrucians Walk, (or *fitchii* F. & Y.) 15
Aëdes diantæus H., D. & K. (or small *lazarensis* F. & Y.) 2

69

The specimens are all females and damaged, so the determinations cannot be made positive.

The same forms were taken along the Albany River at Height of Land, Osnaburg, Fort Hope and Ghost River; but on the shores of James Bay, although *punctor* persists, *fletcheri* and *curriei* appear, indicating comparative absence of forests.

Typically Canadian Species

Aëdes punctor Kirby.

Culex punctor Kirby, Richardson's Fauna Bor. Am., iv, 309, 1837.
Culex abserratus Felt & Young, Science, n.s., xx, 312, 1904.
Culicelsa auroides Felt, Bull. 79, N. Y. State Mus., 448, 1905.
Aëdes centrotus Howard, Dyar & Knab, Mosq. No. & Cent. Am. & W. I., 747, 1917.
Aëdes provocans Howard, Dyar & Knab (? non Walker), Mosq. No. & Cent. Am. & W. I., 748, 1917.

This is the most dominant and widespread species of the Canadian fauna. Its limits are well known in the east, but it extends westward in the Rockies, how far has not been determined.

The usual form of adult has the mesonotum yellow-scaled, with a single square band of brown scales in the middle. This corresponds exactly with Kirby's types of *punctor* as carefully redescribed by Theobald, so that I have no doubt of the identification. The *auroides* of Felt is the same. The species also varies, giving rise to a form with the mesonotum almost uniformly brown, on which the names *abserratus* and *centrotus* have been founded. Felt further indicates larval differences between *auroides* and *abserratus;* but these are completely bridged in my series from White River, Ontario. The species is distinctly variable both as adult and larva.

Swarming of the males was observed at Dryden, Ontario, and Winnipeg Beach, Manitoba. At Dryden, while sitting under a pine tree at the edge of a cow pasture in which were many alder bushes and poplar trees, when the sun had set and it was getting distinctly dark, a male was seen going to and fro under the branches of the pine tree some six to eight feet from the ground. The insect could only be seen by looking toward the light sky. Other males joined this one and about a dozen gathered. In about half an hour, as the darkness deepened, they all disappeared. At Winnipeg Beach swarming took place by the edge of a road through tall poplars. A few males were seen high up opposite a projecting branch.

The differences given between *abserratus* and *auroides* are as follows:

abserratus: Larva. Comb scales, 6; head hairs single; pecten of tube about 15; adult with brown mesonotum (*centrotus* type).

auroides: Larva. Comb scales 12; head hairs double; pecten of tube about 20; adult with yellow mesonotum and brown stripe *(auroides).*

The table on page 16 shows the connection that I established between these forms. It is curious that the variation in the larva and adult seems to be correlated.

A variety occurs in which the median mesonotal stripe is divided, giving two brown lines, situated in a brown cloud, the sides of mesonotum pale. This resembles *decticus,* but some of the yellow color remains and there are no head-spots. An exactly similar form of *lazarensis* occurs, more commonly than this form of *punctor.*

Fresh mounts of the male genitalia show curved appressed setæ on the apical lobe of side piece. The genitalia are, therefore, not separable from those of *aboriginis* Dyar and *hexodontus* Dyar, as previously supposed by me (Ins. Ins. Menstr., vi, 78, 1918). These species, *aboriginis* and *hexodontus,* are probably derivatives of *punctor,* the genitalia retaining their specialized form though other characters have changed.

One thousand one hundred and eighty-one specimens were collected from the following localities: White River, On-

Sex	Isolation No.	No. of comb-scales	Head hairs	Pecten teeth	Adult
Male	C5	6	$\frac{1}{2}\left\|\frac{2}{1}\right.$	19	*centrotus*
Female ..	B39	7	$\frac{1}{2}\left\|\frac{1}{2}\right.$	16	dark *auroides*
Male	C111	8	$\frac{1}{1}\left\|\frac{1}{1}\right.$	16	*auroides* (double stripe)
Male	B18	9	$\frac{2}{2}\left\|\frac{2}{2}\right.$	17	*auroides*
Male	B44	10 & 11*	$\frac{2}{2}\left\|\frac{2}{2}\right.$	15 & 17*	do.
Male	B40	12	$\frac{-}{2}\left\|\frac{-}{2}\right.$	18	*auroides* with side stripes
Female ..	B43	13	$\frac{1}{1}\left\|\frac{1}{1}\right.$	23	do.
	C14	14	$\frac{1}{1}\left\|\frac{1}{2}\right.$	21	*auroides*
	C14	15	$\frac{1}{1}\left\|\frac{1}{1}\right.$	19	do.
	C9	17	$\frac{1}{2}\left\|\frac{1}{2}\right.$	18	do.

* Laterally dimorphic.

tario, June 12-27, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 27-July 2, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Prince Albert, Saskatchewan, August 14-15, 1918; Saskatoon, Saskatchewan, August 10-12, 1918; Red Deer, Alberta, July 29-August 3, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918; Lake Minnewanka, Alberta, July 22, 1918; Banff, Alberta, July 9-15, 1918.

In addition, I have a specimen from Field, British Columbia, August 15, 1903 (H. G. Dyar), which was erroneously cited in the monograph (page 735) under *lazarensis;* Fort

Snelling, Minnesota (through C. S. Ludlow); Saxeville, Wisconsin, May 9-26, 1910 (B. K. Miller); Height of Land, Ontario, June 7, 1918 (H. N. Awrey); Osnaburg, Ontario, June 21, 1918 (H. N. Awrey); Fort Hope, Ontario, June 27, 1918 (H. N. Awrey); Martin Fall, Ontario, July 5, 1918 (H. N. Awrey); Ghost River, Ontario, July 7, 1918 (H N. Awrey); Albany, Ontario, July 10-16, 1918 (H. N. Awrey); Attawapiscat, Ontario, July 13, 1918 (H. N. Awrey); Moose Factory, Ontario, July 26, 1918 (H. N. Awrey); Kenogami River, Ontario, June 30, 1903 (W. J. Wilson); Mammamattawa, Ontario, August 27, 1903 (W. J. Wilson); Dublin, New Hampshire, June 20, 1909 (F. C. Stowell); Sorrento, Maine, July 2, 1906 (———).

Aëdes lazarensis Felt & Young.

Culex lazarensis Felt & Young., Science, n.s., xx, 312, 1904.

Normally this is a medium sized mosquito, the mesonotum with dark yellow scales, two moderately broad dark brown median stripes and short posterior sublateral ones. A variety occurs in which the sides of the mesonotum are grayish, the yellow disk suffused with a brown shade, especially between the lines. This is indistinguishable from the corresponding aberration of *punctor*. This form occurs in the Rocky Mountains almost to the exclusion of the normal form.

The male genitalia as tabulated by me (Ins. Ins. Menstr., vi, 78, 1918) are incorrect. The apical lobe of the side piece is in fact well haired, the specimens which I had before me being in fact *decticus,* misidentified. The table may be corrected as follows:

23. Apical lobe of side piece weakly and sparsely setose..... 24
    This lobe more strongly setose..... 25
24. Adjacent setæ of basal lobe nearly as long as the spine, *prodotes* Dyar
    These setæ shorter and weaker....*decticus* Howard, Dyar & Knab
25. Spine of basal lobe situated distally.*tahoënsis* Dyar, *altiusculus* Dyar
    Spine of basal lobe situated basally..... 26
26. Setæ on basal lobe many, much shorter than the spine, *lazarensis* Felt & Young
    These setæ sparse, not much shorter than the spine..*pionips* Dyar

Males were seen swarming at Kenora, Ontario. They appeared after sunset when it was becoming distinctly dark. They were seen on the top of a hill, flying before pine trees, being associated although not mixed with a swarm of *Mansonia perturbans* Walk.

The larva has the head hairs single; comb-scales numerous with feathered tips; pecten of the air tube uniform; anal segment with strongly chitinized plate, emarginate on the side.

Seven hundred and ninety specimens were taken as follows: White River, Ontario, June 13-25, 1918; Nipigon, Ontario, June 26, 1918; Kenora, Ontario, July 2, 1918; Dryden, Ontario, July 1-2, 1918; Red Deer, Alberta, July 30-August 3, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918; Banff, Alberta, July 8-25, 1918; Laggan, Alberta, July 11, 1918.

Besides the localities cited in the monograph (Field, B. C. being incorrect), I have specimens from White Mountains, New Hampshire (H. K. Morrison); Saxeville, Wisconsin (B. K. Miller). See also my remarks under *intrudens* for locality Ottawa, Ontario, and *pullatus* for locality Kaslo, British Columbia. Mr. H. N. Awrey collected specimens at Height of Land, Osnaburg, Fort Hope and Ghost River, Ontario, in June and July, 1918.

Doubtful specimens before me, which may be this with narrow lines, or the form of *punctor* with median stripe divided, Kenogami River, Ontario, June 30, 1903 (W. J. Wilson); Nagagami River, Ontario, 20th portage, June 14, 1903 (W. J. Wilson); Nagagami River, Ontario, June 19, 1903 (W. J. Wilson). The mesonotal lines in these are narrow and light, in one blurred together, and I think they are forms of *punctor*. The continuation of this line of variation gives the mesonotum entirely golden yellow. I have taken this form rarely, about one in a thousand, but none of my bred material developed into it, so I do not know certainly whether it is a variety of *lazarensis* or of *punctor*.

Aëdes pionips, new species.

Similar to *lazarensis* F. & Y., but larger and more heavily marked. The mesonotum is light yellow scaled, the two median stripes broad, dark brown, contiguous and running back close to the posterior lateral stripes; legs black, knee-spots white; abdominal bands incised or broken on the dorsal line; wing-scales black; head yellow-scaled with a large black patch on each side.

Types, male and female, No. 21922, U. S. Nat. Mus.; White River, Ontario, June 19 and 21, 1918. A cotype has been deposited at Ottawa in the Entomological Branch, Department of Agriculture, Canada.

Males were seen swarming at Prince Albert, Saskatchewan. They appear after sunset when it is becoming distinctly dark, flying high in openings in the forest. They were over an overgrown road between dwarf spruces in a swamp and there was also a small swarm of *Aëdes canadensis* present. The period of flight does not seem to last over half an hour.

Larvæ occurred in small mossy pools in a spruce swamp. They are large, dark colored fellows; head hairs in fives; other characters essentially as in *lazarensis*, but more pronounced.

Eggs were obtained from captive females at Red Deer. It is elliptical-fusiform, flattened on one side, the micropylar end sharply tapered, black, shining, very finely reticular-granular. The eggs are long and narrow and of good size. They are deposited singly, as usual in *Aëdes*.

One hundred and fifty-two specimens were taken as follows: White River, Ontario, June 17-25, 1918; Nipigon, Ontario, June 26, 1918; Prince Albert, Saskatchewan, August 14-18, 1918; Red Deer, Alberta, July 30-August 3, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918; Lake Louise, Alberta, July 11-17, 1918.

Besides the above, a single female was taken by Mr. Knab at White River, Ontario, June 24, 1907; another, Kenogami River, Ontario, June 30, 1903 (W. J. Wilson). One specimen, taken by Mr. Awrey on Albany River seems to be this, but I am not sure. The specimen has been returned to Ottawa.

Aëdes diantaeus Howard, Dyar & Knab.

Aëdes diantaeus Howard, Dyar & Knab, Mosq. No. and Cent. Am. and W. Ind., iv. 758, 1917.

This was described from New Hampshire from two damaged males, the species being founded solely on the male genitalia. The ornamentation is correctly indicated in the text, but wrongly in the table. The adult is indistinguishable in coloration from *lazarensis*. The mesonotum tends to be yellower, less of a buff or brownish yellow, but the difference is less than the variation. The two dark brown lines vary in width; the posterior lateral stripes are commonly weak, but sometimes well-developed. The male genitalia are, of course, very distinct.

The males probably swarm high. One evening, at White River, after sunset, a male was seen flying in the top of a small spruce tree in the forest, but no others were observed.

Larvæ occurred in small mossy pools in a spruce swamp. Head hairs in threes; antennæ very long, fully as long as the head, slender, uniformly tapered, a long tuft near the middle; comb of about 13 scales, each scale terminating in a long thorn; air tube about three times as long as wide, the last two teeth of the pecten widely detached, followed by the single tuft; anal segment with a large dorsal plate, reaching near the ventral line and roundedly edged.

The larva is as distinct and characteristic as are the male genitalia.

One hundred and twenty-eight specimens were collected, as follows: White River, Ontario, June 14-25, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 27-July 2, 1918; Kenora, Ontario, July 2, 1918.

Mr. Knab got 29 specimens which I think are referable here at White River, June 25, 1907. I have no western records; but the species is so similar to *lazarensis* that it can only be certainly differentiated by males or larvæ, which are not at hand from the western places. A specimen taken by Mr. Awrey on Albany River, which I have returned to Ottawa, seems to be this. Another doubtful specimen is before me from Kenogami

River, Ontario, June 30, 1903 (W. J. Wilson); it is large and strongly marked, yet looks more like this than *pionips*.

Aëdes decticus Howard, Dyar & Knab.

Aëdes decticus Howard, Dyar & Knab, Monog., iv, 737, 1917.

Aëdes trichurus Howard, Dyar & Knab (in part, not Dyar), Monog., iv, 762, 1917.

Aëdes lazarensis Dyar (not Felt & Young), Ins. Ins. Menstr., vi, 78, 1918.

The type of *decticus* is a single female, strongly and aberrantly marked. The four black spots on the head are distinct, but they may be faint, confused or absent. The coloration is very variable, but usually characteristic. A female from White River, recorded in the monograph under *trichurus*, is this species. The male genitalia tabulated by me as *lazarensis* belong to *decticus*.

This species, like *intrudens*, extends slightly beyond the Canadian region, having been taken in Plattsburg, New York, and St. Paul, Minnesota. In spite of its wide range, the species was never clearly recognized, but was confused with other things. It is quite recognizable, however, when once apprehended.

The larva is close to that of *lazarensis*, being smaller and frailer. The anal segment has the plate without sharp lateral edge, thinning out below and obsoletely encircling the segment.

Two hundred and thirty-four specimens were obtained as follows: White River, Ontario, June 13-15, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 27-July 2, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Red Deer, Alberta, July 30-31, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918.

Besides these, I have specimens from Plattsburg, New York, April 21, 1905 (H. G. Dyar); Elizabethtown, New York, April 25, 1905 (H. G. Dyar); Winnipeg, Manitoba, June 22, 1907 (F. Knab); Aitkin County, Minnesota, May 16, 1916 (C. W. Howard); St. Paul, Minnesota, May, 1916 (C. W. Howard). A single specimen, taken on Albany River by Mr. Awrey,

which I have returned to Ottawa, seems to be this, as well as the damaged condition allows me to judge.

Aëdes prodotes Dyar.

Aëdes trichurus Howard, Dyar & Knab (in part, not Dyar), Monog., iv, 762, 1917.
Aëdes prodotes Dyar, Ins. Ins. Menstr., v. 118, 1917.

This is the Rocky Mountain form of *decticus*, differing slightly in the male genitalia. The basal lobe of the side piece has the setæ that are adjacent to the spine nearly as long as it, whereas in *decticus* they are distinctly shorter. Some of the adults resemble *decticus* closely in coloration, but most are browner, suffused, the two black lines lost and often only distinguishable from *intrudens* by the grayer scales over the antescutellar space. The larva is unknown.

Two females recorded from Banff in the monograph under *trichurus* are this species.

The males were seen swarming at Banff. On the summit of a hill on the Tunnel Mountain Road, covered with lodgepole pine and low bushes, swarms were observed low down about two feet from the ground, here and there in front of the bushes. This was at the usual swarming time, a quarter of an hour after sunset, which, in that latitude, was a quarter of 10 p. m. Half an hour later no swarms were to be found.

The Californian *A. cataphylla* Dyar is practically identical in marking with *prodotes*, but I think it is not the same, on account of the geographic discontinuity. Male and larva of *cataphylla* are unknown.

Eight hundred and one specimens rewarded my efforts, as follows: Banff, Alberta, July 7-26, 1918; Lake Minnewanka, Alberta, July 22, 1918; Laggan, Alberta, July 11, 1918; Lake Louise, Alberta, July 11, 1918.

At Lake Louise this was almost the only species flying, 401 specimens being taken in one day's collecting. Only three other species occurred, of which the most numerous was taken in seven examples.

Other records are: Bozeman, Montana (cotype of *pro-*

dotes); Banff, Alberta, August 16, 1903 (R. P. Currie); Lake Louise, Alberta, August 13-17, 1906 (Dyar & Caudell); Field, British Columbia, August 15, 1906 (H. G. Dyar); Mt. Cheam, British Columbia, August 7, —— (J. Fletcher).

Aëdes intrudens, new species.

Culex impiger Felt (not Walker), Bull. 79, N. Y. State Mus., 316, 1904.

Aëdes impiger Howard, Dyar & Knab (not Walker), Monog., iv, 755, 1917.

I propose this name for the species identified as *impiger* Walker by Dr. E. P. Felt, and fully treated under that name in the monograph. *A. impiger* remains to be identified, which may be possible from an examination of the types I select as types of *intrudens* three males, Karner, New York, May 13, 1904 (N. Y. State Coll.); White River, Ontario, June 25, 1907 (F. Knab); Banff, Alberta, July 9, 1918 (H. G. Dyar). Type No. 21823, U. S. Nat. Mus.

This is the only species of the fauna whose adults enter houses, which they do persistently. Both at White River and Banff, with other species in abundance out of doors, only this was encountered within, and often in such numbers as to be distinctly annoying.

The species ranges throughout the Canadian fauna and also slightly beyond it. In the east it has been recorded from Massachusetts and it was abundant at Banff, Alberta, being the commonest species early in the season after *prodotes* began to diminish. It appears to be represented in the mountains of California by *A. fisheri* Dyar, of which the male and larva are unfortunately unknown.

Males were beaten from bushes, but the swarming was not observed.

Eggs were obtained from captive females at Banff. The single egg is rather stoutly fusiform, quite straight on one side, the two ends pointed about alike; black, shining, very minutely and slightly granular; micropylar area large. They are deposited singly.

One thousand seven hundred and nineteen specimens were obtained, as follows: White River, Ontario, June 12-25, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 29-30, 1918; Winnipeg Beach, Manitoba, July 5, 1918; Lake Minnewanka, Alberta, July 22, 1918; Banff, Alberta, July 7-25, 1918; Laggan, Alberta, July 11, 1918.

Eastern records are found in the monograph under *impiger* (page 757). They are correct, except that "Ottawa, Ontario (J. Fletcher)" should be transferred to *lazarensis*.

The species with broad white rings at the bases of the tarsal joints may be separated as below, improving my genitalic table (Ins. Ins. Menstr., vi, 78-79, dichotomies 27-34), omitting *bimaculatus,* which does not concern us here.

An unfortunate difficulty arises under *sansoni,* described from females from Banff. I identified this as a supposed Rocky Mountain species, specimens having been cited from Drummond and Missoula, Montana, Juliaetta and Sand Point, Idaho, Modern, Colorado (Cockerell), and Salt Lake County, Utah, April 12, 1914 (C. T. Vorhies). The form is sufficiently distinct from *excrucians;* though close in the genitalia, the larva is very different, resembling *stimulans.* But it turns out that it does not occur at Banff! Males which I collected there last season belong to *excrucians* and *fitchii,* so it is clear that the name *sansoni* must be referred to the synonymy of one of these. I select *excrucians* as the larger and commoner species, not being able to tell these apart with females only.

This leaves the Rocky Mountain form again without a name. I therefore propose the name MUTATUS, specifying as types of **Aëdes mutatus,** new species, males from Missoula, Montana. Type No. 21918, U. S. Nat. Mus.

All the American species whose genitalia are known are given in the table, though only four of them concern us in the Canadian fauna. *A. stimulans* Walk. seems not to occur in the fauna proper, although taken in its southern limits (Plattsburg, New York). *A. excrucians* and *fitchii* are characteristic members of the Canadian fauna, though distributed somewhat

outside of it. *A. fletcheri* and *riparius* do not strictly belong to it, entering a certain distance from the wooded prairies, as remarked above.

Basal lobe of side piece with a stout spine, stouter than the setæ.
Spine very strong and distinct.
Basal lobe strongly tubercular-expanded; filament of harpago anguarly widened beyond middle.....*stimulans* Walker
Basal lobe rugose-papillose, the area extending nearly to apical lobe; filament of harpago broadly expanded near base, *fletcheri* Coquillett
Spine weak, scarcely differentiated from the adjacent setæ.
Basal lobe moderate.
Spine fairly strong; filament of harpago short notched at base, *fitchii* Felt & Young
Spine weaker; filament without a basal notch.
Spines of basal appendages moderate.....*mimesis* Dyar
These spines long.....*palustris* Dyar
Basal lobe highly conical; filament of harpago long with broad knife-blade expansion.....*riparius* Dyar & Knab
Basal lobe without a spine.
Basal lobe rugose-papillose, the area reaching up nearly to apical lobe .....*excrucians* Walker
Basal lobe tubercular-expanded.
Filament of harpago angularly expanded toward base, *mutatus* Dyar
This filament expanded beyond the middle.....*increpitus* Dyar

Aëdes excrucians Walker.

Culex excrucians Walker, Ins. Saund., 429, 1856.
Culex abfitchii Felt, Bull. 79, N. Y. State Mus., 381, 1904.
Culex siphonalis Grossbeck, Can. Ent., xxxvi, 332, 1904.
Aëdes sansoni Dyar & Knab, Can. Ent., xli, 102, 1909.
Aëdes euedes Howard, Dyar & Knab, Monog., iv, 714, 1917.

I have the following notes on the type of *Culex excrucians:* "*Culex excrucians* Walker. Type, identified as such by E. A. Waterhouse according to label; 'Saunders, 68-4;' folded label '*excrucians*' in Walker's script. Almost entirely denuded; both antennæ gone; two hind legs and one middle leg left, no terminal joints. Tarsal rings broad and basal; abdomen completely banded, uniformly brown (specimen looks as though it had been in alcohol); abdomen tapers and cerci are exserted." Notes made by Dr. L. O. Howard, dated June 25, 1909.

Clearly this represents one of the *fitchii* group. I have selected *abfitchii* as the most abundant and dominant species and therefore most likely to have been before Walker.

This species occurs throughout our area and extends outside of it, in the east as far south as New Jersey. Its westward limits are not yet known. Adult females tend to be larger than *fitchii* and have less of white scales on the wings, but the difference is far from being diagnostic.

Males were seen swarming at Banff. They fly shortly after sunset in small swarms, very high in openings in the woods, roads, or the tops of smaller trees. The swarms are loose and open, clustering for a few seconds in one spot, then dashing away to a distance. The swarming period does not seem to exceed half an hour.

Males were demonstrated from the following localities: White River, Ontario (F. Knab, 1907); Dryden, Ontario, Red Deer and Banff, Alberta (Dyar, 1918).

Aëdes fitchii Felt & Young.

Culex fitchii Felt & Young, Science, n.s., xx, 312, 1904.

Males were observed swarming at Banff. They fly in small groups, after sunset, high in openings in the forest, much as with *excrucians*, though they seem less wild and flighty. The smaller appearance of the specimens is noticeable.

Specimens recorded by me as *mimesis* from Aweme, Manitoba, June 13-July 10, 1910 (N. Criddle) (Ins. Ins. Menstr., v, 116, 1917), should be referred here.

Males were demonstrated from the following localities: White River, Ontario (F. Knab, 1907); Dryden, Ontario (Dyar, 1918); Winnipeg, Manitoba (Knab, 1907); Banff, Alberta (Dyar, 1918).

Unassorted specimens of *excrucians* and *fitchii* were taken in 1,370 examples, as follows: White River, Ontario, June 15-25, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 27-July 2, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Saskatoon, Saskatchewan, August 10-20, 1918; Prince Albert, Saskatchewan,

August 14-18, 1918; Red Deer, Alberta, July 29-August 4, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918; Nordegg, Alberta, August 6, 1918; Calgary, Alberta, July 28, 1918; Lake Minnewanka, Alberta, July 22, 1918; Banff, Alberta, July 7-27, 1918; Lake Louise, Alberta, July 11, 1918.

Also females which may be *excrucians* or *fitchii* were collected at Martin Fall, Ontario, July 5, 1918 (H. N. Awrey); Fort Qu' Appelle, Saskatchewan, July 9, 1901 (J. Fletcher).

Aëdes riparius Dyar & Knab.

Aëdes riparius Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 213, 1907.

Described from Winnipeg, Manitoba. In the monograph we add the localities Aweme, Manitoba, and Saxeville, Wisconsin, from females and therefore not certainly placed. *A. fletcheri* Coq. is not distinguishable in the female. Demonstrated males are before me only from Winnipeg, the type locality. The larva is unknown.

Aëdes fletcheri Coquillett.

Culex fletcheri Coquillett, Proc. U. S. Nat. Mus., xxv, 84, 1902.[1]

This species has been considered peculiar to the prairies; but it occurs in the forest as well, as I demonstrated a male from Red Deer, Alberta, taken in spruce forest, August 3, 1918.

Unassorted specimens of *riparius* and *fletcheri* were taken in 127 examples, as follows: White River, Ontario, June 24, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 30, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Saskatoon, Saskatchewan, August 11-13, 1918; Prince Albert, Saskatchewan, August 14-17, 1918; Red Deer, Alberta, July 29-August 3, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918.

[1]The synonyms given in the monograph, *flavescens* Theobald (not Fabricius) and *arcanus* Blanchard, do not belong here, the form in question being from Finland as shown by F. W. Edwards (Entomologist, 1912, p. 218). It is said to be either *maculatus* Meigen, or a species near to that.

Large specimens of *fletcheri* or *riparius* were taken at Albany, Ontario, at the mouth of the Albany River, on James Bay, July 10, 1918 (H. N. Awrey).

Aëdes canadensis Theobald.

Culex canadensis Theobald, Mon. Culic., ii, 3, 1901.
Culex nivitarsis Coquillett, Proc. Ent. Soc. Wash., vi, 168, 1904.

This species is not confined to the Canadian zone, extending in the east to Florida. It is widespread in the northern forests. The larvæ frequent open pools and roadside ditches, not being found in the dark mossy pools in spruce forest which shelter the early stages of the species with black tarsi.

For observations on swarming of males, see note under *Aëdes pionips*.

Five hundred and forty-one specimens came to hand, as follows: White River, Ontario, June 13-19, 1918; Nipigon, Ontario, June 26, 1918; Dryden, Ontario, June 30-July 9, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Saskatoon, Saskatchewan, August 10-20, 1918; Prince Albert, Saskatchewan, August 14-17, 1918; Red Deer, Alberta, July 30-August 3, 1918; Lochearn, Alberta, August, 5-7, 1918; Lamoral, Alberta, August 6, 1918; Banff, Alberta, July 19, 1918; Lake Louise, Alberta, July 11, 1918.

Aëdes vexans Meigen.

Culex vexans Meigen, Syst. Beschr. Eur. Zweifl. Ins., vi, 241, 1830.
Culex articulatus Rondani, Bull. Soc. Ent. Ital., iv, 30, 1872.
Culex malariae Grassi, Rend. della R. Accad. dei Lincei, 1899.
Culex sylvestris Theobald, Mon. Culic., i, 406, 1901.
Culex vagans Theobald, Mon. Culic., i, 411, 1901.
Culex nocturnus Theobald, Mon. Culic., iii, 159, 1903 (♀ only).
Culex montcalmi Blanchard, Les Moust., 407, 1905.
Culicada nipponii Theobald, Mon. Culic., iv, 337, 1907.
Culicada minuta Theobald, Mon. Culic., iv, 338, 1907.
Culex stenœtrus Theobald, Mon. Culic., iv, 395, 1907.
Culicada eruthrosops Theobald, Mon. Culic., v, 229, 1910.
Culex pscudostenoetrus Theobald, Mon. Culic., v, 343, 1910.
Culex hirsutum Ludlow, Psyche, xviii, 126, 1911.
Aëdes euochrus Howard, Dyar & Knab, Monog., iv, 716, 1917.

Widely distributed in temperate regions in both Europe and America.

A remarkable swarm of males was witnessed at Banff. The writer and a companion went down to the open field beyond the boathouse after sunset. On emerging from the tall timber that borders the road a swarm of males was seen overhead about 10 feet from the ground. There must have been about 500 specimens and this cloud followed us some 200 yards into the open, keeping directly overhead. A number were captured in the net, and the swarm dispersed, but quickly gathered again. After some 15 minutes, it having become nearly dark, on another attempt to net specimens the swarm dispersed and vanished completely, apparently flying back to the timber. Nothing was seen of it again.

Five hundred and sixty specimens of this species were taken, as follows: Dryden, Ontario, June 27-July 2, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-12, 1918; Saskatoon, Saskatchewan, August 10-20, 1918; Prince Albert, Saskatchewan, August 14-17, 1918; Red Deer, Alberta, August 1, 1918; Lochearn, Alberta, August 7, 1918; Lamoral, Alberta, August 6, 1918; Calgary, Alberta, July 28, 1918; Lake Minnewanka, Alberta, July 22, 1918; Banff, Alberta, July 7-27, 1918.

Aëdes cinereus Meigen.

Aëdes cinereus Meigen, Syst. Beschr, zweifl. Ins., i, 13, 1818.
Culex nigritulus Zetterstedt, Dip. Scand., ix, 3459, 1850.
Aëdes fuscus Osten Sacken, Bull. U. S. Geog. Surv., iii, 191, 1877.
Culex pallidohirta Grossbeck, Can. Ent., xxxvii, 359, 1905.
Culex pallidocephala Theobald, Mon. Culic., v. 612, 1910.

This species is widespread in north temperate regions in Europe and America. The usual form has the abdomen without pale transverse bands, the lateral white spots being continuous, forming a straight pale stripe. About half of the specimens before me have the abdominal bands more or less distinct and in these the lateral spots are wedge-shaped and do not reach the posterior borders of the segments, thus not forming the characteristic lateral stripe.

Two hundred and seventy-two specimens came to hand, as follows: White River, Ontario, June 18-23, 1918; Dryden, Ontario, June 29-July 2, 1918; Kenora, Ontario, July 2, 1918; Winnipeg Beach, Manitoba, July 4-5, 1918; Saskatoon, Saskatchewan, August 12, 1918; Prince Albert, Saskatchewan, August 14-17, 1918; Red Deer, Alberta, July 29-August 2, 1918; Lochearn, Alberta, August 5, 1918; Lamoral, Alberta, August 6, 1918; Calgary, Alberta, July 28, 1918; Lake Minnewanka, Alberta, July 22, 1918; Banff, Alberta, July 7-27, 1918.

Culicella dyari Coquillett.

Culex dyari Coquillett, Journ. N. Y. Ent. Soc., x, 192, 1902.
Culex brittoni Felt, Ent. News, xvi, 79, 1905.

This species is fairly closely confined to the Canadian region, extending not far beyond it. Larvæ were found at White River in the mossy pools with the black-legged *Aëdes*.

Three adults were taken: White River, Ontario, June 20, 1918; Red Deer, Alberta, July 30, 1918.

The males of this species are strongly attracted to light. A collection of mosquitoes was made at arc lights in Wilmington, Massachusetts, in July, 1910, by Mr. H. S. Barber, with the following result:

Culicella dyari Coq., 107 males, 2 females.
Aëdes canadensis Theob., 4 males, 15 females.
Aëdes aurifer Coq., 1 male, 13 females.
Aëdes vexans Meig., 3 males, 8 females.
Aëdes excrucians Walk., 1 male, 4 females.
Aëdes cinereus Meig., 2 males, 2 females.
Culex saxatilis Grossb., 6 males.
Culex sp. (*restuans* or *pipiens*), 2 females.
Mansonia perturbans Walk., 1 male.

That over 60 per cent of these captures at light (or 80 per cent counting males alone) consisted of *dyari*, a species usually so rare as to be seldom taken, shows that the light must exercise a peculiar attraction for the species. Mosquitoes are not generally attracted to light in numbers, but of those that do come the males are in large excess of the females. This does

not appear in the above table, for, exclusive of *dyari,* there are 44 females to 18 males. I suppose this to be due to the fact that the collector could not distinguish between those females attracted to light and those that came with designs upon his person. That this is the correct explanation of the large number of females taken, I think is shown by a consideration of the *Culex*. The *saxatilis,* which bites frogs, was present only in males, whereas the *restuans* or *pipiens,* which will attack man, was represented by females. Moreover, I have a collection of mosquitoes taken at trap light in Lafayette, Indiana, by Mr. J. J. Davis, July, 1916, consisting almost wholly of *Aëdes vexans,* and in this the males largely outnumber the females. The captures being made in a trap light excludes the element of attraction of the females for purposes of feeding.

Culex restuans Theobald.

Culex territans Walker, Ins. Saund., Dipt., i, 428, 1856 (nomen non conservandum).
Culex restuans Theobald, Mon. Culic., ii, 142, 1901.
Culex brehmei Knab, Proc. Biol. Soc. Wash., xxix, 161, 1916.

Found rarely in the forested region in the east. The larvæ inhabit open pools with *Aëdes canadensis*. This species ranges well to the south along the Atlantic seaboard.

Seven specimens were taken: White River, Ontario, June 16-July 4, 1918. Mr. Knab found third stage larvæ on June 24, 1907, also at White River.

Anopheles occidentalis Dyar & Knab.

Anopheles occidentalis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 159, 1906.

Widely distributed in the western United States, following the Canadian forests eastward. The species is rare in the north; only two specimens were taken: Kenora, Ontario, July 2, 1918.

Mansonia perturbans Walker.

Culex perturbans Walker, Ins. Saund., Dipt., 428, 1856.
Culex ochropus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 100, 1907.

This widespread species was found in the timbered country in the lake region. Eighty-five examples are at hand, as follows: Dryden, Ontario, June 30-July 2, 1918; Kenora, Ontario, July 2, 1918.

Swarming was observed at both Dryden and Kenora. The males appeared after sunset, swarming in a similar manner to *Aëdes punctor* and *lazarensis* and in company with these species, although the swarms did not become mixed together.

Culiseta impatiens Walker.

Culex impatiens Walker, List Dipt., Brit. Mus., i, 5, 1848.
Culex pinguis Walker, Lord's Nat. in Vanc. I. & B. C., ii, 337, 1866.
Culex absobrinus Felt, Bull. 79, N. Y. State Mus., 481, 1905.

This species is characteristic of the Canadian fauna, but extends outside of it, reaching the Pacific coast and the mountains of California. Only five specimens were found: White River, Ontario, June 12-22, 1918; Red Deer, Alberta, August 1, 1918. At Red Deer a single male flew out of a cold well, but it was not possible to ascertain whether there were any larvæ in the water.

Species Entering the Margin of the Canadian Zone

Culiseta inornatus Williston.

Culex inornatus Williston, U. S. D. A., Div. Or. & Mam., No. Am. Fauna, No. 7, 253, 1893.
Culex magnipennis Felt, Bull 79, N. Y. State Mus., 278, 1904.

Widely distributed throughout the United States, entering the Canadian region only in mild, open localities.

Seventeen specimens were captured, as follows: Winnipeg Beach, Manitoba, July 9-19, 1918; Saskatoon, Saskatchewan, August 10-13, 1918; Lochearn, Alberta, August 5, 1918; Lamoral, Alberta, August 6, 1918; Banff, Alberta, August 1-5, 1918.

Culiseta incidens Thomson.

Culex incidens Thomson, Kgl. Sven. Freg. Eug. Resa, vi, Dipt., 443, 1868.
Culex particeps Adams, Kans. Univ. Sci. Bull., ser. 2, ii, 26, 1903.

This Pacific coast species enters the Canadian region only in the Rocky Mountains. Fourteen specimens were preserved: Banff, Alberta, July 26-27, 1918; Lake Louise, Alberta, July 18-23, 1918.

Culiseta alaskaënsis Ludlow.

Theobaldia alaskaënsis Ludlow, Can. Ent., xxxviii, 326, 1906.

This northern species enters the Canadian zone in the Rocky Mountains. Nineteen specimens are at hand, all from Banff, Alberta, July 7 to August 10, 1918.

Larvæ were found in a grassy pool by the railroad, separated by a few feet from the Echo River, the pool having evidently been filled by flood-water.

Head rounded, the antennæ small and dark, a tuft near the middle, the part beyond it tapering; head hairs multiple (7:4). Lateral comb of the eighth segment of many spines in a patch, the single spines with feathered tips. Air-tube about two-and-a-half times as long as wide; pecten of eight teeth with one large and one small branch, followed by long hairs to the middle of the tube. Anal segment ringed by the plate, which is perforated for the ventral tufts.

Aëdes pullatus Coquillett.

Culex pullatus Coquillett, Proc. Ent. Soc. Wash., vi, 168, 1904.
Aëdes acrophilus Dyar, Ins. Ins. Menstr., v, 127, 1917.

This species abounds in the higher Rockies, breeding in open muddy pools about lakes and rivers. It was scarce at Banff, apparently not extending out of the foot-hills.

To my surprise, *acrophilus* proves to be this species. It appears that I had obtained a wrong impression of *pullatus*, calling it a *gray* species, whereas the mesonotum is really yellow. Evidently my impression was based on some Kaslo specimens which are not *pullatus*, but either the western form of *lazarensis* or very large *prodotes*. These forms were not recognized from Kaslo at that time (1903); but it is probable that the Canadian fauna reaches that region in its entirety. My researches last year did not cover the area, as I stopped at the Continental Divide.

Males of *pullatus* were observed swarming at Banff after sunset, high in the spruce forest in little openings between the trees, some 10 to 15 feet from the ground. They could be reached only with a long net.

Two hundred and ninety specimens were obtained, as follows: Banff, Alberta, July 14-15, 1918; Lake Louise, Alberta, July 11-25, 1918. Only one *pullatus* was taken flying at Lake Louise, July 11, those brought from there being in larvæ and pupæ at that date.

Aedes hirsuteron Theobald.

Culex hirsuteron Theobald, Mon. Culic., ii, 98, 1901.
Culex pretans Grossbeck, Ent. News, xv, 332, 1904.

This species occurs at the eastern limits of the Canadian fauna and extends well to the south. A similar form, *aestivalis* Dyar, appears in the western Rockies (Kaslo, British Columbia; Sand Point, Idaho), the two being apparently separated by a geographical interval. In the eastern wooded prairies a form occurs which I am in doubt about in the absence of male and larva. It is smaller than *hirsuteron* and *aestivalis,* the mesonotum gray with median brown stripe, wing-scales black. It is larger than *aldrichi,* and does not show the divided mesonotal stripe of that species. I propose to hold it under the name VINNIPEGENSIS. Type of **Aëdes vinnipegensis,** new species, No. 21921, U. S. Nat. Mus. A cotype has been deposited at Ottawa, Canada.

Thirty-seven females, Winnipeg Beach, Manitoba, July 4-5, 1918.

Two of the specimens show a development of the posterior lateral stripes, accompanied by a brown lateral dot on either side of the mesonotal median stripe. I have also four specimens of the same from Aweme, Manitoba, July 6 and August 4, 1910 (N. Criddle). The costa, first and third veins look blacker than the subcostal, second and fourth veins, although all the scales are black.

Specimens of normal size appear farther south. I have 68 specimens from Fort Snelling, Minnesota, taken by Maj. E.

B. Frick on June 10, 1906 (communicated by Dr. C. S. Ludlow). The species must be common there. The adults have the partly bicolored veins of *vinnipegensis;* but this marking I detect in eastern *hirsuteron* also, although perhaps it is not quite so pronounced. The status of these forms must await the discovery of males and larvæ for elucidation.

Aëdes trichurus Dyar.

Culex trichurus Dyar, Journ. N. Y. Ent. Soc., xii, 170, 1904.
Culex cinereoborealis Felt & Young, Science, n.s., xx, 312, 1904.

Rather unexpectedly, this species was not met with. This fact led to a reëxamination of the specimens listed in the monograph, where specimens are cited apparently continuing the range throughout the Canadian region. White River, Ontario, depends upon a single small female, which I consider to be *decticus*, of the form without the black lines; Aweme, Manitoba, depends upon a single large light gray female, which I think is really *trichurus;* Banff, Alberta, depends upon two females which are quite normal *prodotes;* Kaslo, British Columbia, is the type locality for *trichurus.* I see in this an analogy with *hirsuteron* as just described, namely an eastern and a western form and an intermediate form in the wooded prairies of Manitoba. Aweme is in southern Manitoba, southeast of Brandon near the Assiniboine River and, although I have not been there, I imagine the country is prairie with patches of bush. Therefore the western *trichurus* should differ slightly from the eastern, especially in the larva. This proves to be the case, the Kaslo form having about half as many scales in the lateral comb as the New York form, which I reared commonly at Plattsburg. The name *trichurus* Dyar will apply to the western form, that of *cinereoborealis* Felt & Young to the eastern one, while I now suggest the name POLIOCHROS for the Manitoban form. The type of **Aëdes poliochros,** new species, is No. 21924, U. S. Nat. Mus., Aweme, Manitoba, June 3, 1904 (N. Criddle). The specimen is light gray, and I note no difference in the female from *cinereoborealis* F. & Y. The male and larva await discovery.

Culex saxatilis Grossbeck.

Culex testaceus van der Wulp, Tidsch, voor Ent. (2), x, 128, 1867.
Culex apicalis Adams (not Theobald), Kans. Univ. Sci. Bull., ii, 26, 1903.
Culex saxatilis Grossbeck, Can. Ent., xxxvii, 360, 1905.
Culex frickii Ludlow, Can. Ent., xxxviii, 132, 1906.

No adults were obtained, but larvæ occurred at Winnipeg Beach, Manitoba, in roadside puddles. The species is widely distributed in forested regions from ocean to ocean and from Canada to Mexico.

Culex testaceus van der Wulp was referred to *Aëdes* in the monograph. In this I think we were misled by Theobald's action in identifying specimens with ringed tarsi as *testaceus*. It is more probably a *Culex* and an earlier name for the present species. The small size of the male, 2¾ lines, as given by the author, would seem to preclude any *Aëdes* except *cinereus*, which, of course, is excluded by the short palpi. Moreover, I have a letter from Dr. C. Ritsema Cz, addressed to Mr. D. W. Coquillett, March 12, 1904, in which he says the type of *testaceus* in the Rijks Museum van Natuuralijkehistorie at Leyden has the palpi slender, not dilated, and but one tooth on the larger claw of the fore tarsi. These are characters of *Culex*, not of *Aëdes*. He says further that there is no line of white scales on the penultimate joint of palpi below, which would make the species not *restuans*, but *saxatilis*. For the rest, the scales on the upper side of thorax and abdomen are said to be very pale yellowish white and the tarsi are unicolorous. The specimen is probably badly faded and bleached and the markings lost. An examination of the male genitalia mounted in balsam would decide the question positively of what *testaceus* is. Awaiting this possibility, I do not make the reference positively; but the evidence at hand points strongly as indicated. Unfortunately, the name *testaceus* is inappropriate and misleading, for this mosquito when fresh is black, certainly not testaceous.

It would be much more desirable if Adams's appropriate

name *apicalis* could be used. I have been under the impression that it was preoccupied by *Culex apicalis* Theobald; but Theobald has changed the name of his *apicalis* [to *neoapicalis*], evidently believing that Adams's name had priority. Moreover, Theobald's species is a *Psorophora* and not improbably a synonym or variety of *cingulatus* Fab., so the names at present repose in different genera. Still I am not in favor of using the name *apicalis* Adams unless it is shown to have priority. Theobald's *apicalis* was published July 25, 1903. I have not the exact date of Adams's paper at hand. It bears the date June, 1903, and very probably was published then, as the prospectus of the Bulletin says: "It has been decided to abandon the quarterly form of issue, and instead to publish the separate papers as soon as they are ready for the printer." Doubt is cast upon the matter by the fact that my copy is enclosed in a cover labeled "Science Bulletin, Vol. II, Nos. 1 2, and 3, November, 1903," received at the National Museum library February 1, 1904. Perhaps the articles were issued in two forms, first as separates and later together in the regular bimonthly bulletin form.

Aëdes spencerii Theobald.

Culex spencerii Theobald, Mon. Culic., ii, 99, 1901.

This is a strictly prairie species, taken only in the open, although the openings may be quite restricted and surrounded by forest. Mr. Knab has published full observations upon the species. (Smiths. Misc. Colls., quart. iss., 1, 541, 1908.)

Fifty-seven specimens were taken. Saskatoon, Saskatchewan, August 11-19, 1918; Lochearn, Alberta, August 5-7, 1918; Lamoral, Alberta, August 6, 1918; Nordegg, Alberta, August 6, 1918; Banff, Alberta, July 8-20, 1918.

Aëdes curriei Coquillett.

Culex curriei Coquillett, Can. Ent., xxxiii, 259, 1901.
Culex onondagensis Felt, Bull. 79, N. Y. State Mus., 278, 1904.
Aëdes quaylei Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 191, 1906.
Culex lativittatus Coquillett, Ent. News, xvii, 109, 1906.

Grabhamia mediolineata Ludlow, Can. Ent., xxxix, 129, 1907.
(?) *Aëdes campestris* Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 213, 1907.

This characteristic prairie species really does not enter the wooded Canadian zone at all; but it is found wherever open grassy spots occur, even well into the Rocky Mountains.

One hundred and forty-three specimens were taken, as follows: Winnipeg Beach, Manitoba, July 4-8, 1918; Wynyard, Saskatchewan, August 13, 1918; Saskatoon, Saskatchewan, August 13, 1918; Banff, Alberta, July 8-26, 1918.

I am citing *campestris* doubtfully in the synonymy because I have not been able to recognize it. Mr. Knab says the species is larger; I have large and small *curriei,* but they do not separate on the character. All mosquitoes vary in size. However, more work in the prairies may clear up the matter and show that the species is really a good one.

This species, *curriei,* reappears along the shores of James Bay (Hudson Bay), perhaps as a salt marsh breeder. I have specimens before me from Moose Factory, Ontario, July 26, 1918 (H. N. Awrey). A larger form, comparable with *campestris,* occurs on an island in James Bay, apparently to the exclusion of other mosquitoes; Charlton Island, July 19, 1918 (H. N. Awrey).

Dr. Hewitt has been good enough to obtain the following information from Mr. J. M. Macoun, of the Canadian Geological Survey, concerning conditions on the shores of James Bay: "From north of the mouth of the Rupert River all around James Bay to far beyond the Albany, the whole coast is bordered by marshes which in some cases extend many miles inland * * *. The vegetation in these marshes is chiefly *Carex*. Nowhere in Canada that I know of do mosquitoes occur in such numbers as around James Bay and along the west coast of Hudson Bay, where the conditions are very similar. I was on Charlton Island thirty years ago and do not remember that any part of the coast there is low. There may be some saline marshes, but I do not remember any. The island is wooded, and inland there are many ponds, small lakes

and marshes. The flora is identical with that of the mainland far from the sea."

Aëdes aurifer Coquillett.

Culex aurifer Coquillett, Can. Ent., xxxv, 255, 1903.

This species should occur in the margin of the Canadian zone, but there are no Canadian records as yet. Besides the data in the monograph, which include Dublin, New Hampshire, and Elizabethtown, New York, I have undoubted *aurifer* from Minneapolis, Minnesota, July 2-3, 1903 (K. Taylor). In all of these three localities *punctor* occurs, showing them to be well within the Canadian zone.

Aëdes triseriatus Say.

Culex triseriatus Say, Journ. Acad. Nat. Sci. Phil., iii, 12, 1823.
Finlaya (?) nigra Ludlow, Can. Ent., xxxvii, 387, 1905.
Aëdes triseriatus var. *hendersoni* Cockerell, Journ. Econ. Ent., xi, 199, 1918.

This tree-hole breeding species probably does not come in the Canadian zone, although it reaches very close to it and may occur in the southern fringe. The northern spruce forests do not form holes holding water, and so the characteristic breeding places of this species are absent.

Aëdes atropalpus Coquillett.

Culex atropalpus Coquillett, Can. Ent., xxxiv, 292, 1902.

This rock-hole breeding species may occur in the Canadian zone, in the eastern part. No records are at hand.

Aëdes varipalpus Coquillett.

Culex varipalpus Coquillett, Can. Ent., xxxiv, 292, 1902.
Taeniorhynchus sierrensis Ludlow, Can. Ent., xxxvii, 231, 1905.

This western tree-hole species occurs in the Kootenai region of the Rocky Mountains, but has not yet been recorded from the main range.